## Claims

1. A process for producing an optically active 3-(4-hydroxyphenyl)propionic acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

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wherein  $R^2$  is an alkyl group,  $R^5$  to  $R^8$  are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof, which comprises reacting a benzaldehyde of the formula (1):

$$R^{5}$$
 $R^{6}$ 
 $R^{1}O$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{1}O$ 

wherein  $R^1$  is a protective group; and  $R^5$  to  $R^8$  are each the same as defined above,

with a glycolic acid derivative of the formula (2):

$$R^2O$$
  $COOR^3$  (2)

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wherein  $\mathbb{R}^3$  is a hydrocarbon group, and  $\mathbb{R}^2$  is the same as defined above,

hydrolyzing the resulting product to give a cinnamic acid of the formula (4):

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$$R^{5}$$
 $R^{6}$ 
 $R^{1}O$ 
 $R^{7}$ 
 $R^{8}$ 
 $OR^{2}$ 
 $COOH$ 
 $COOH$ 

wherein  $R^1$ ,  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof, and subjecting the cinnamic acid (4) or a salt thereof to asymmetric hydrogenation to give an optically active phenylpropionic acid of the formula (5):

$$R^{5}$$
 $R^{6}$ 
 $R^{1}O$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{7}$ 

wherein all the symbols are each the same as defined above, or a salt thereof, followed by deprotection.

2. A process for producing an optically active 3-(4-, hydroxyphenyl) propionic acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{6}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{7}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{6}$ 
 $R^{6}$ 

wherein  $R^2$  is an alkyl group;  $R^5$  to  $R^8$  are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof, which comprises reacting a benzaldehyde of the formula (1):

$$R^{5}$$
 $R^{1}$ 
 $R^{7}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^1$  is a protective group; and  $R^5$  to  $R^8$  are each the same as defined above,

with a glycolic acid derivative of the formula (2):

$$R^2O$$
  $COOR^3$  (2)

wherein  $R^3$  is a hydrocarbon group, and  $R^2$  is the same as defined above, followed by hydrolysis to give a cinnamic acid of the formula (4):

$$R^{5}$$
 $R^{1}$ 
 $R^{1}$ 
 $R^{1}$ 
 $R^{2}$ 
 $R^{3}$ 
 $R^{4}$ 
 $R^{1}$ 
 $R^{2}$ 
 $R^{3}$ 
 $R^{4}$ 
 $R^{4}$ 
 $R^{5}$ 
 $R^{6}$ 
 $R^{2}$ 
 $R^{4}$ 
 $R^{4}$ 

wherein  $R^1$ ,  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof, and subjecting the cinnamic acid (4) or a salt thereof to asymmetric hydrogenation.

3. A process for producing an optically active 3-(4-15 hydroxyphenyl)propionic acid of the formula (6):

wherein  $R^2$  is an alkyl group;  $R^5$  to  $R^8$  are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof, which comprises reacting a 4-hydroxybenzaldehyde of the formula (7):

$$R^5$$
 $R^6$ 
 $R^8$ 
 $R^8$ 
 $R^8$ 
 $R^8$ 

wherein  $R^5$  to  $R^8$  are each the same as defined above, with a glycolic acid derivative of the formula (2):

$$R^2O$$
 COOR<sup>3</sup> (2)

wherein R<sup>3</sup> is a hydrocarbon group; and R<sup>2</sup> is the same as defined above, followed by hydrolysis to give a 4-hydroxycinnamic acid of the formula (9):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

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wherein  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof, and subjecting the 4-hydroxycinnamic acid (9) or a salt thereof to asymmetric hydrogenation.

4. The process according to any one of claims 1 to 3, wherein the asymmetric hydrogenation is carried out in the presence of a chiral catalyst.

- 5. The process according to any one of claims 1 to 4, wherein the chiral catalyst is a transition metal complex.
- 6. The process according to claim 5, wherein the transition metal complex is a complex of the metal of Groups 8 to 10 in the periodic table.
- 7. A process for producing an optically active 10 carboxylic acid of the formula (12):

$$R^{12}$$
 $*$ 
 $COOR^{13}$ 
 $OR^{14}$ 
(12)

wherein  $R^{11}$  and  $R^{12}$  are each independently a hydrogen atom or a substituent;  $R^{13}$  is a hydrogen atom, an optionally substituted hydrocarbon group or a metal atom;  $R^{14}$  is a hydrogen atom or a protective group; and the symbol \* is an chiral carbon atom, or a salt thereof, which comprises subjecting an  $\alpha,\beta$ -unsaturated carboxylic acid of the formula (11):

$$R^{12}$$
 $C00R^{13}$ 
 $OR^{14}$ 
(11)

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wherein R<sup>11</sup> to R<sup>14</sup> are each the same as defined above,
or a salt thereof, to asymmetric hydrogenation in the presence
of a transition metal complex, provided that when the transition
metal complex is rhodium, the protective group represented by
R<sup>14</sup> in the above formula (11) is a group other than acyl.

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8. The process according to claim 7, wherein the transition metal complex is a complex of the metal of Groups 8 to 10 in the periodic table.

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- 9. The process according to claim 1 or 3, wherein the chiral catalyst is a mixture of a chiral ligand and a transition metal compound.
- 10. The process according to any one of claims 1 to 3, wherein the optically active phenylpropionic acid of the formula (5) or a salt thereof obtained by the method according to any one of claims 1 to 3 is crystallized from a solvent.
- 11. The process according to claim 10, wherein the solvent used for the crystallization is a member selected from the group consisting of hydrocarbons, alcohols, ketones and water, and a mixture thereof.
- 20 12. The process according to any one of claims 1 to 3, wherein the optically active 3-(4-hydroxyphenyl)propionic acid of the formula (6) or a salt thereof obtained by the method according to any one of claims 1 to 3 is crystallized from a solvent.

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13. The process according to claim 12, wherein the solvent used for the crystallization is a member selected from the group consisting of aromatic hydrocarbons, aliphatic hydrocarbons, alcohols and water, and a mixture thereof.

14. A process for producing an optically active phenylpropionic acid of the formula (5):

$$\begin{array}{c|c}
R^5 & *C00H \\
R^10 & R^8 & 0R^2
\end{array} (5)$$

wherein R<sup>1</sup> is a protective group; R<sup>2</sup> is an alkyl group; R<sup>5</sup> to R<sup>8</sup> are each independently a hydrogen atom or a substituent; and the symbol \* is an chiral carbon atom,

or a salt thereof

which comprises subjecting a cinnamic acid of the formula (4):

$$\begin{array}{c|c}
R^5 & COOH \\
R^1O & R^8 & OR^2
\end{array}$$
(4)

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wherein  $R^1$ ,  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof,

to asymmetric hydrogenation.

15. A process for producing an optically active 3-(4-hydroxyphenyl) propionic acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^2$  is an alkyl group;  $R^5$  to  $R^8$  are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof, which comprises subjecting a cinnamic acid of the formula (4):

$$\begin{array}{c|c}
R^{5} & COOH \\
R^{1}O & R^{8} & OR^{2}
\end{array}$$
(4)

wherein  $R^1$ ,  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof, to asymmetric hydrogenation.

16. A process for producing an optically active 3-(4-hydroxyphenyl) propionic acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{8}$ 
 $R^{7}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^2$  is an alkyl group;  $R^5$  to  $R^8$  are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof,

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which comprises subjecting a 4-hydroxycinnamic acid of the formula (9):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof to asymmetric hydrogenation.

17. A process for producing an optically active 3-(4-hydroxyphenyl)propionic acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein R<sup>2</sup> is an alkyl group; R<sup>5</sup> to R<sup>8</sup> are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof, and an optically active phenylpropionic acid of the formula (5):

$$\begin{array}{c|c}
R^5 & *C00H \\
\hline
R^10 & R^8 & OR^2
\end{array}$$
(5)

wherein  $R^1$  is a protective group; and  $R^2$ ,  $R^5$  to  $R^8$  and the symbol \* are each the same as defined above,

or a salt thereof, which comprises subjecting a cinnamic acid of the formula (4):

$$R^{5}$$
 $R^{6}$ 
 $R^{1}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^1$ ,  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof, to asymmetric hydrogenation.

18. A process for producing an optically active 3-(4-hydroxyphenyl)propionic acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^2$  is an alkyl group,  $R^5$  to  $R^8$  are each independently a hydrogen atom or a substituent; and the symbol \* is a chiral carbon atom,

or a salt thereof, which comprises reacting a benzaldehyde of the formula (1):

$$R^{5}$$
 $R^{6}$ 
 $R^{1}$ 
 $R^{1}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein  $R^1$  is a protective group; and  $R^5$  to  $R^8$  are each the same as defined above,

with a glycolic acid derivative of the formula (2):

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$$R^2O$$
 COOR<sup>3</sup> (2)

wherein  $R^3$  is a hydrocarbon group, and  $R^2$  is the same as defined above,

hydrolyzing the resulting product to give a cinnamic acid of the formula (4):

$$R^{5}$$
 $R^{6}$ 
 $R^{1}$ 
 $R^{1}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{8}$ 
 $R^{2}$ 
 $R^{3}$ 
 $R^{4}$ 

wherein  $R^1$ ,  $R^2$ , and  $R^5$  to  $R^8$  are each the same as defined above, or a salt thereof, and subjecting the cinnamic acid (4) or a salt thereof to asymmetric hydrogenation to give an optically active phenylpropionic acid of the formula (5):

$$\begin{array}{c|c}
R^5 & *C00H \\
R^10 & R^8 & 0R^2
\end{array} (5)$$

wherein all the symbols are each the same as defined above, or a salt thereof, and an optically active 3-(4-hydroxyphenyl)propionic—acid of the formula (6):

$$R^{5}$$
 $R^{6}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 
 $R^{8}$ 

wherein all the symbols are each the same as defined above, or a salt thereof, followed by deprotection.